Message

From: Nedland, Thomas S - DNR [Thomas.Nedland@wisconsin.gov]
Sent: 1/28/2021 8:40:13 PM
To: 'eric.m.norton@usace.army.mil' [eric.m.norton@usace.army.mil]; Pelloso, Elizabeth [Pelloso.Elizabeth@epa.gov]; Weaver, Kerryann [weaver.kerryann@epa.gov]
Subject: FW: Help - Quick Review?

Fyi – Our hydrogeologist thinks the drawdown is going to be a lot more substantial. Please see below.

He is going to look a little closer and get me some refined numbers, but I think this ties into the need to shift the bank boundary quite a bit north...

Jeff (our Hydrogeologist) is also doubtful about this site's ability to maintain a high groundwater table. He believes the groundwater table rise this site has experienced in the past few years is not going to persist, and should return to normal levels in the not too distant future (once the area stops having 200+year storm events). His professional opinion is that the groundwater table will drop to previous levels.

I am not sure if/how to use this information, but just thought I would pass this along.

Take care,

Tom

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Tom Nedland, PWS
Wetland Mitigation Coordinator – Waterways/External Services Wisconsin Department of Natural Resources
107 Sutliff Avenue, Rhinelander, WI 54501
Phone: 920-286-3739
Thomas.Nedland@Wisconsin.gov

From: Helmuth, Jeffrey A - DNR <Jeffrey.Helmuth@wisconsin.gov>
Sent: Thursday, January 28, 2021 10:27 AM
To: Nedland, Thomas S - DNR <Thomas.Nedland@wisconsin.gov>
Subject: RE: Help - Quick Review?

Tom,

I should re-explain some things. The hydraulic conductivity is not the same thing as distance from the well. Hydraulic conductivity is a measure of how easily water can pass through the aquifer. Reducing the distance from the pumping well to the wetland is a different thing entirely. That said, your 2nd bullet point is correct, if only by accident. Using their parameters, if the well is only 100 feet away the drawdown increases from 0.37 to 0.57 in the 176 gpm pumping scenario. But I'm not going to hang my hat on that because the parameters look off.

I did the analysis assuming that the site is somewhere near Big Hollow Road, which I found on the map. Five well logs in the areas show consistent specific capacities of around 20 gpm/ft. This can be converted to transmissivity and the resulting analysis is a lot different than if you use the K=250 ft/d and 179 ft thickness used by the consultant.

- If the well pumps at 176 gpm for 120 days, drawdown at 500 feet from the well would be approximately 2.6 feet
- If the well pumps at 45 gpm for 120 days, drawdown at 500 feet from the well would be approximately 0.64 feet
- If the well pumps at 176 gpm for 120 days, drawdown at 100 feet from the well would be approximately 4.6 feet
- If the well pumps at 45 gpm for 120 days, drawdown at 100 feet from the well would be approximately 1.2 feet

Keep in mind that these estimates assume zero recharge.

Hope this helps. Feel free to call.

Jeff

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Jeff Helmuth
jeffrey.helmuth@wisconsin.gov
Cell Phone: (608) 332-2785

From: Nedland, Thomas S - DNR <Thomas.Nedland@wisconsin.gov>
Sent: Thursday, January 28, 2021 7:51 AM
To: Helmuth, Jeffrey A - DNR <Jeffrey.Helmuth@wisconsin.gov>
Subject: FW: Help - Quick Review?

Whoops – meant to copy you on this.

I left you a voice message on this. Thanks for your help thus far.

I'll need to reach out to you tomorrow or early next week for some clarification, but below is how I put your response into my own words. I included EPA and COE on this email because we have a meeting with the consultant this morning.

I will be vague with the consultant when I speak with them on this matter, and let them know we will have some suggestions/recommendations for them early next week.

Sound like a plan?

Thanks again,

Tom

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Tom Nedland, PWS
Wetland Mitigation Coordinator – Waterways/External Services Wisconsin Department of Natural Resources
107 Sutliff Avenue, Rhinelander, WI 54501
Phone: 920-286-3739
Thomas.Nedland@Wisconsin.gov

From: Nedland, Thomas S - DNR
Sent: Thursday, January 28, 2021 7:44 AM
To: Weaver, Kerryann <weaver.kerryann@epa.gov>; 'eric.m.norton@usace.army.mil' <eric.m.norton@usace.army.mil>
Subject: FW: Help - Quick Review?

Fyi – here is my take-away:

1) DNR agrees the Theis method is proper to determine the drawdown, but does not feel some of the parameters used for the calculation were appropriate.
2) We need to look at how close the well is to the wetland. If it is within 100 feet of the wetland, the drawdown would approximately double.
3) DNR recommends use of higher pumping rate parameter to calculate the drawdown. The rational being that during a dry year, when recharge approaches zero (like Theis assumes), and pumping is at its highest, water use can be much higher than average.
    a. DNR recommends an iterative process that starts with the pump capacity as the pumping rate, and then working back down to more a realistic pumping rate.

I will try to get a hold of Jeff Helmuth quick before our call with Jeff Kraemer.

Thanks,

Tom

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Tom Nedland, PWS
Wetland Mitigation Coordinator – Waterways/External Services Wisconsin Department of Natural Resources
107 Sutliff Avenue, Rhinelander, WI 54501
Phone: 920-286-3739
Thomas.Nedland@Wisconsin.gov

From: Helmuth, Jeffrey A - DNR <Jeffrey.Helmuth@wisconsin.gov>
Sent: Wednesday, January 27, 2021 7:50 PM
To: Nedland, Thomas S - DNR <Thomas.Nedland@wisconsin.gov>
Subject: RE: Help - Quick Review?

Tom,

Sorry about the delayed response. Their calculations are correct. The parameters seem within the reasonable range for a sand and gravel aquifer. With better location information we might be able to improve on them. The 250 ft/d hydraulic

conductivity is very high but that's not uncommon in a sand and gravel aquifer. I'm not sure how that fits with a wetland only 500 ft away though. At 100 ft/d the drawdown at 500 ft would double.

Also, the use of an average pumping rate is not protective. If we were doing the analysis for a new high-capacity well (and we still considered wetlands in our review process) we'd use a higher pumping rate which would produce more drawdown. In a dry summer, when recharge approaches zero (like Theis assumes), and pumping is at its highest, water use can be much higher than average. This is also the time when water resources and their biota are most sensitive. So we typically start our reviews using pump capacity as the pumping rate and work our way down to more realistic scenarios. For a more protective analysis we could simply multiply the pumping rate by a safety factor, like 4. So using their analysis at 176 gpm (for the well irrigating the whole field) would be worst-case look at annual impacts from irrigating ¼ of that field.

Feel free to call if you want to discuss.

Jeff

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Jeff Helmuth
jeffrey.helmuth@wisconsin.gov
Cell Phone: (608) 332-2785

From: Nedland, Thomas S - DNR <Thomas.Nedland@wisconsin.gov>
Sent: Wednesday, January 27, 2021 8:48 AM
To: Helmuth, Jeffrey A - DNR <Jeffrey.Helmuth@wisconsin.gov>
Cc: Weaver, Kerryann <weaver.kerryann@epa.gov>; 'eric.m.norton@usace.army.mil' <eric.m.norton@usace.army.mil>
Subject: Help - Quick Review?

Hi Jeff,

I just IM'd you, but wanted to follow up with an email. Attached is the pdf I mentioned in the IM. Item 4 on page 3 is where we could use your help. Our big question is whether you think it is appropriate to use the Theis Method to calculate a drawdown, if there was not necessarily field data used to populate the parameters (used well log and reported pumping rate info instead).

Also just looking for your general knowledge/opinion – Do you expect that a high capacity well near Spring Green would only generate a 0.1 foot drawdown within 500 feet? I know there are a lot of variables to consider, but just looking for a gut reaction.

I've tried to suss out some of the information from a 400+ page document that may be useful to you. Here is some of the information I've pulled from that larger document:

- The Theis method was used to simulate pumping during the 4-month irrigation season when the irrigation well at the site typically operates. Existing conditions simulations used the average pumping rate from 2010 – 2018 of 179 gpm. Proposed conditions simulations used 25% of this pumping rate (45 gpm) because ¾ of the irrigated area will be removed from production for the mitigation project. Water table drawdown due to pumping was evaluated at distances from the well of 500 ft (within the mitigation site) and 1500 ft (Big Hollow Rd.) at the end of the 4-month irrigation season. With the proposed reduction in pumping, there will be less water table drawdown. For proposed conditions, the water table is estimated to be 0.1 ft higher 500 ft and 0.04 ft at 1500 ft (Appendix B, Figures B16-B19). Note that the water table elevation will still be lower than it would be if the irrigation well were shut down completely.

- Here is the predicted existing drawdown of the well, currently (see below)

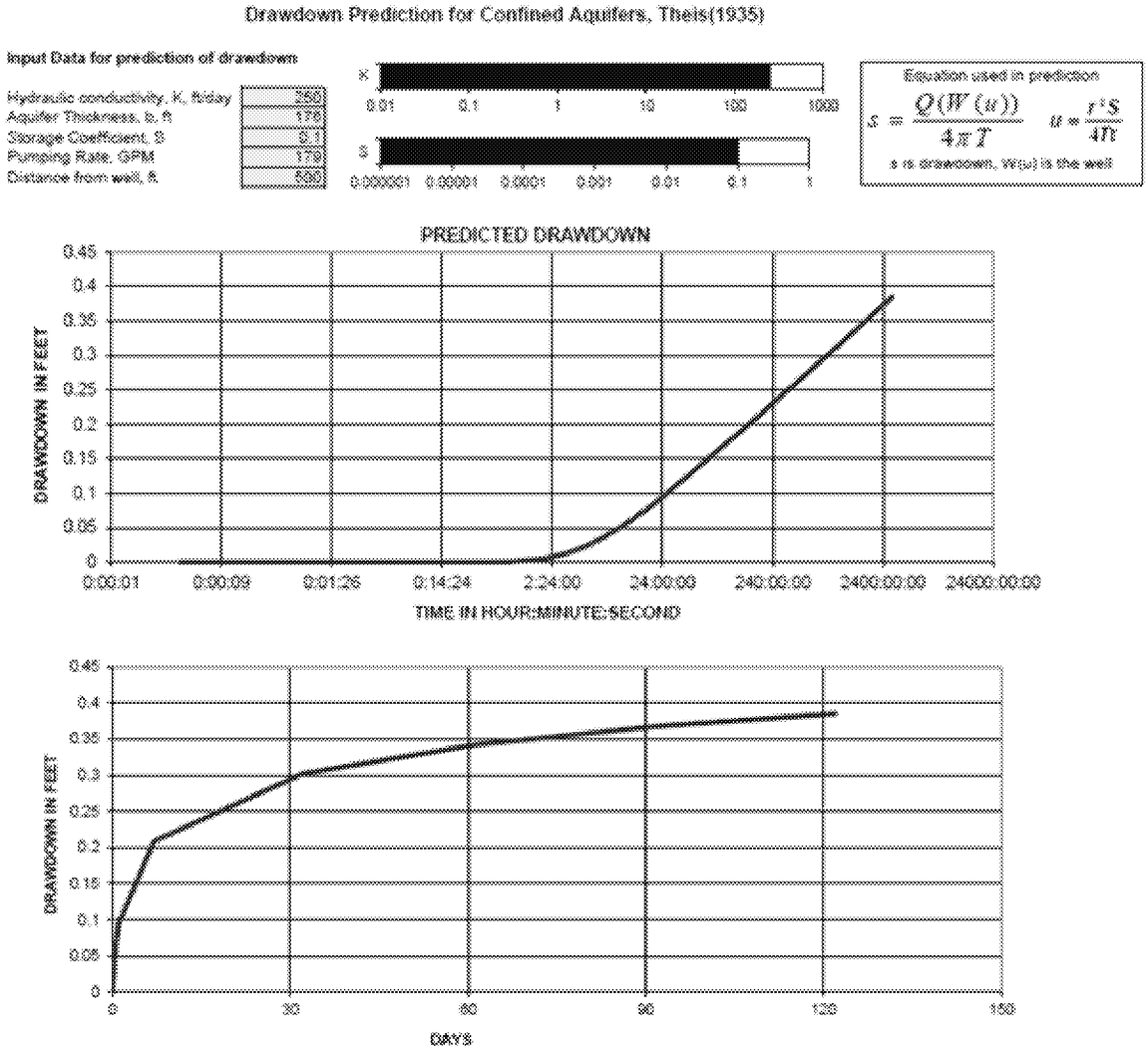

Figure B16. Theis drawdown prediction for the on-site irrigation well for existing conditions at a distance of 500 ft (0.38 ft at end of 4-month growing season).

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- Here is the predicted drawdown if 75% of the area is removed from irrigation (see below)

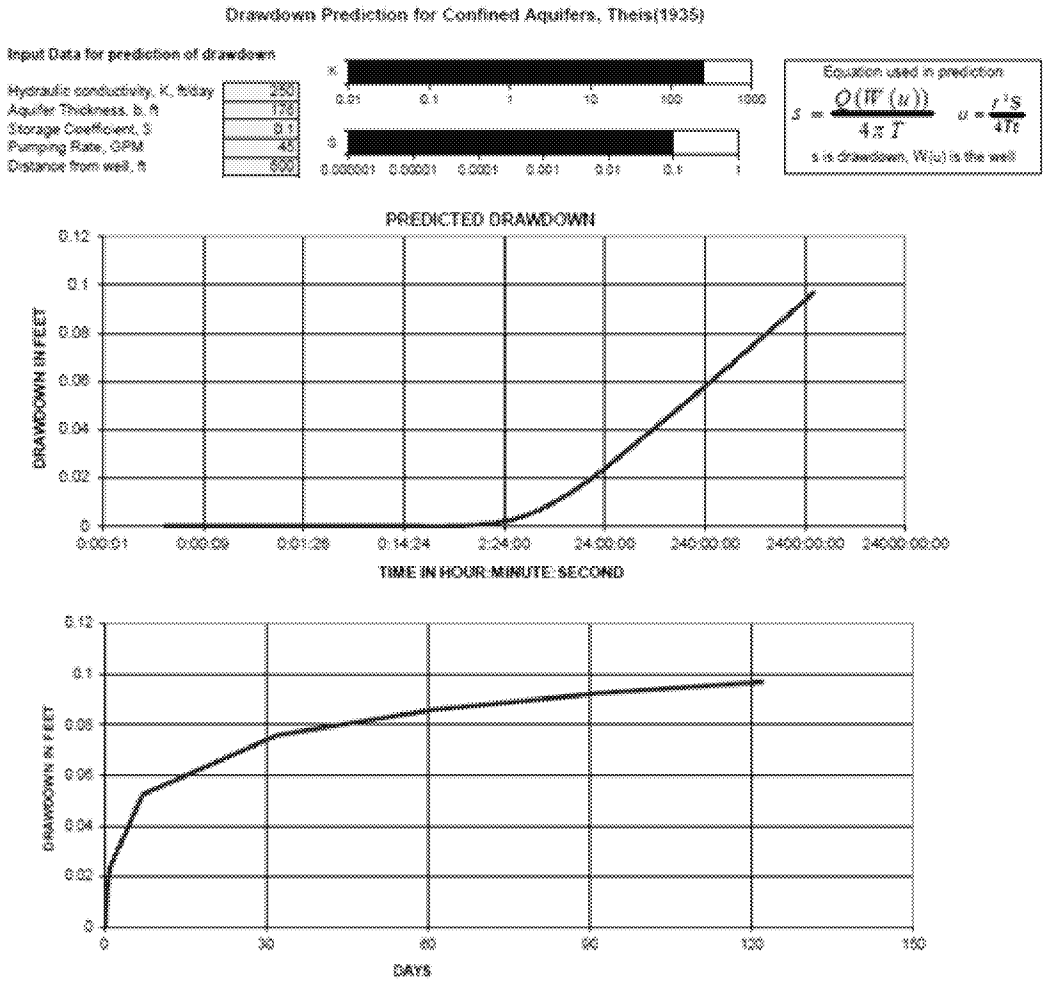

Figure B17. Theis drawdown prediction for the on-site irrigation well for proposed conditions at a distance of 500 ft (0.1 ft at end of 4-month growing season).

Any help you could provide would be greatly appreciated.

Please give me a call if you would like to discuss.

Thanks,

Tom

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Tom Nedland, PWS
Wetland Mitigation Coordinator – Waterways/External Services

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Phone: 920-286-3739
Thomas.Nedland@Wisconsin.gov


dnr.wi.gov